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REMARKS

Claims 1-7 are pending in this application.

Removal of Objection to Specification

The specification has been objected to as page 3, line 21 since "R" must be changed to be a divalent moiety. In response to this objection, page 3, lines 21-22 have been corrected so as to include divalent bonds for each of the changed formulas. It is submitted that all of these corrections are minor in form and the fact that these formulas are divalent would have easily been recognized by one skilled in the art upon a review of the entire context of the present specification, including the examples therein. Consequently, it is submitted that the basis for this objection has been removed such that the objection should be withdrawn.

Removal of Issue under 35 U.S.C. § 112

Claims 1-3 and 5 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite based on the reasons stated at items (6)-(9) on page 3 of the Office Action. Regarding the items (6) and (8), the proposals stated therein have been adopted in the claims as suggested in the Office Action. Concerning item (7), it is noted that the substituent "A" was meant to be referred

to for the acid anhydride group and that this definition in the claims has been clarified such that this basis for objecting to claim 1 has been removed. Concerning item (9), the definition of substituent "E" has been clarified. Consequently, it is submitted that the basis for the above-noted rejection have been removed such that this rejection should be withdrawn. It is further noted that all of the present pending claims comply with all applicable requirements under 35 U.S.C. § 112.

Issue under 35 U.S.C. § 102(e) and 103(a)

Claims 1-3 and 5 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Watakabe '912 (USP 6,203,912) or Morken '970 (USP 6,221,970).

Claims 1-3 and 5 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '130 (Japanese Patent Application No. 10-237130) in combination with Watakabe '912 or Morken '970.

Both of the above-noted rejections are traversed for the following reasons.

Removal of Rejection under 35 U.S.C. § 102(e)

Watakabe '912 and Morken '970 both disclose fluoropolymers having a "CF₂-CF" structure which is derived from a CF₂=CF-R structure. That is, both of the fluoropolymers disclosed by

Watakabe '912 and Morken '970 have a perfluorovinyl-based structure.

In contrast, the fluoropolymer product produced by the method of the present invention has a "CH₂-CF" structure which is derived from a CH₂=CF-R vinylidene-based structure. Consequently, both Watakabe '912 and Morken '970 fail to disclose the method or product thereof of the present invention such that the basis for the above-noted rejections under 35 U.S.C. § 102(e) has been removed.

Additional Distinctions Undermining Basis for Rejection under 35 U.S.C. § 103(a)

Since both Watakabe '912 and Morken '970 fail to disclose or suggest the vinylidene-based structure employed in the fluoropolymer of the methods of the present invention, both of these documents fail to provide a basis for asserting obviousness under 35 U.S.C. § 103(a). First, both Watakabe '912 and Morken '970 fail to disclose or suggest to one skilled in the art a method for curing a vinylidene-based fluoropolymer as in the present invention. Second, the underlying structures of the monomers of Watakabe '912 and Morken '970 differ from the main structures of the monomers used to make the product of the method of the present

invention, such that it is expected that the properties of the product polymers will also differ.

For example, with regard to Watakabe '912, it is noted that the examples described therein did not produce a high molecular weight product. In Example 1, an 8-mer (octamer) is produced having a molecular weight of 3.112; Example 2 produced a 6-mer(hexamer) having a molecular weight of 2.334; and Example 13 produced a 25-mer having a molecular weight of 7,650, which is the highest molecular weight among the products of Examples in Watakabe '912. All the molecular weights are less than 10,000. In general, such products having a molecular weight of less than 10,000 are not considered polymers but rather oligomers. These oligomers of Watakabe '912 can only be used as cured coatings on a substrate which is self-supporting.

In addition, the crosslinked oligomer has a high elastic modulus (modulus of elasticity) (see Example 17, etc.). Such a high elastic modulus means that the molecular weight M_c between crosslinking sites is low. According to L.E. Nielse, *J. Macromol. Rev.*, 9, C3, 69(1968), M_c has the following relationship with elastic modulus E' :

$$M_c = dRT/G = 3dRT/E'$$

G: Shear modulus ($=E'/3$)

d: Density (g/cm^3)

R: Gas constant

E': Elastic modulus at $(T_g+40)^\circ\text{C}$

T: Absolute temperature for $(T_g+40)^\circ\text{C}$

According to the above relationship, the 25-mer of Example 17 of Watakabe '912 has an M_c of 490.

Elastic modulus = 5×10^9 dyn/cm² at 300°C

Density = 1.7g/cm³ (assumed).

Consequently, the cured film of the oligomer of Watakabe '912 has a very high crosslinking density and is very fragile. Therefore, the film cannot be self-supporting and requires a substrate when the film is put to practical use. In the case of a copolymer, when the monomer of Watakabe '912 is copolymerized with tetrafluoroethylene, the copolymer has a perfluorinated backbone structure and therefore has a very low solubility in a solvent. Such a copolymer can only be dissolved in perfluorinated solvents.

In contrast, the polymer of Example 3 of the present invention has an M_c of 14,100 and the following characteristics:

Weight average molecular weight = about 20,000 (by GPC);

Elastic module = 1.5×10^7 dyn/cm² at 227°C ; and

Density = 1.7 g/cm³ (assumed).

Thus, according to the present invention, the cured (crosslinked) polymer is not fragile and can be removed from a substrate as can be seen from Example 1 of the present application.

Therefore, the film is self-supporting and can be used without any substrate which allows for a wider variety of practical application. Also, since a copolymer according to the present invention has hydrogen atoms in the backbone, it can be dissolved in a non-perfluorinated solvent such as CFC-225, when the content of tetrafluoroethylene is 50 mol% or less.

In view of the above, it is submitted that significant patentable distinctions exist between the present invention and Watakabe '912. It is further submitted for essentially parallel reasons that the present invention patentably defines over Morken '970 as well.

JP '130 discloses a curing method of a copolymer of a specific fluorine-containing nitrile compound which includes a vinylidene structure.

JP '130 fails to disclose or suggest the method of the present invention for curing a fluorine-containing polymer of the formulas recited in any of the present claims. Further, JP '130 fails to adequately relate to the perfluorovinyl-based structure polymers described by Watakabe '912 and Morken '970, such that there fails to be an adequate basis for a motivation to one skilled in the art to combine JP '130 with either of these other documents. Therefore, it is submitted that significant patentable distinctions

exist between the present invention and JP'130, whether taken alone or improperly combined with either Watakabe '912 or Morken '970.

It is submitted for the reasons stated above that all of the presently pending claims define patentable subject matter such that the present application should be placed into condition for allowance.

Maintained Traversal of Election Requirement

Applicants respectfully maintain a traversal of the Election Requirement which is indicated to be made "final" at page 2 of the Office Action of July 25, 2003. It is submitted that the entire articulated basis for the Election Requirement relies on the conclusion that claim 1 does not define over the prior art. However, for the reasons stated above, it is submitted that all of the presently pending claims define over the prior art. It is further submitted that all of the present claims share a special technical feature in that all of these claims are directed to methods for curing fluorine-containing polymers having a vinylidene-based structure. It is further submitted that there is no undue burden placed on the Examiner to examine all of the subject matter encompassed by the present claims. Therefore, it is again requested that the Election Requirement be withdrawn. It is

further noted that this Election Requirement does not appear to be in accordance with applicable PCT Unity of Invention Rules.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) respectfully petition(s) for a one (1) month extension of time for filing a reply in connection with the present application, and the required fee of \$110.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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